CLAIMS

What is claimed is:

1. An apparatus for performing data packet transfers over a network, comprising:

a network interface configured for communication over a network according to a layered communication protocol;

a media access communication (MAC) layer within said network interface; and

means for optimizing data transfers as controlled from within said MAC layer by formatting network packets and performing partial packet retransmissions, and/or the suppression of unnecessary packet acknowledgments.

2. An apparatus for performing data packet transfers over a network, comprising:

a network interface configured for communication over a network according to a layered communication protocol;

a media access communication (MAC) layer within said network interface; and

at least one optimization process executing within said MAC layer and configured for formatting and processing network packets;

wherein said processing comprises

(i) performing partial packet retransmission, and/or

(ii) suppressing unnecessary packet acknowledgments.

3. An apparatus as recited in claim 2, wherein said network interface comprises a transport control protocol (TCP) packet queue configured for retaining a plurality of network packets.

4. An apparatus as recited in claim 2, wherein said partial packet retransmission system is configured for dividing a network packet frame into a plurality of data blocks including a first plurality of retransmission data blocks for

retransmissions between a sender and a receiver.

5. An apparatus as recited in claim 4, wherein said plurality of data blocks further includes a second plurality of payload data blocks configured for transmitting payload information from said sender to said receiver.

6. An apparatus as recited in claim 5, wherein said plurality of data blocks further comprise checksum data for recovering data bit errors in said plurality of data blocks for increasing the reliability of the transmission of said plurality of data blocks.

7. An apparatus as recited in claim 6, wherein said checksum data is implemented in a software scheme.

8. An apparatus as recited in claim 5, wherein said plurality of data blocks further comprises:

forward error correction (FEC) data configured for determining whether said data blocks are corrupted or unrecoverable;

whereby the reliability of transmitting the plurality of said data blocks is increased.

9. An apparatus as recited in claim 8, wherein said forward error correction is at least partially performed by electronic hardware.

10. An apparatus as recited in claim 2, wherein the ACK suppression system is configured to modify said MAC layer to allow ACK packet suppression in the network.

11. An apparatus as recited in claim 10, wherein said ACK suppression system speeds the transfer of network data for each ACK packet deleted in the TCP packet queue in the network.

12. An apparatus as recited in claim 10, wherein said ACK suppression

system is configured to piggyback unreceived data blocks transmitted in a first of said plurality of data blocks partially transmitted within a second of said plurality of data blocks transmitted subsequent to the first when the sender receives a partial acknowledgment from the receiver.

13. An apparatus as recited in claim 12, wherein said ACK suppression system is configured for having said sender retransmit the entire data frame if said sender receives a negative acknowledgment from the receiver for a transmitted data frame, and as long as the retransmission does not exceed a maximum retransmission time.

14. An apparatus as recited in claim 13, wherein said data frame comprises a data frame formatted according to the IEEE 802 standard.

15. An apparatus as recited in claim 13, wherein said data frame is a Transmission Control Protocol (TCP) formatted data frame.

16. A method of optimizing network data transfer, comprising:

dividing a network packet frame into a plurality of data blocks;

partially retransmitting untransmitted data blocks in said plurality of data blocks corresponding to the network packet frame; and

suppressing portions of said plurality of data block transmit acknowledgments between a sending node and a receiving node by deleting transmit acknowledgments that do not deleteriously affect communication performance between said sending node and said receiving node.

17. A method as recited in claim 16, further comprising checking each of the plurality of data blocks in the network packet frame using a forward error correction (FEC) information scheme attached to the network packet frame to determine whether a particular data block in the plurality of data blocks is correct or recoverable.

18. A method as recited in claim 17, wherein said checking is configured for sending an acknowledgment by said receiving node to said sending node with reference to a transmitted network packet frame in response to said plurality of data blocks being correct or recoverable.

19. A method as recited in claim 17, wherein said checking is configured for sending a partial acknowledgment from said receiving node to said sending node with respect to a transmitted network packet frame, in response to said plurality of data blocks being corrupt or unrecoverable.

20. A method as recited in claim 19, wherein said checking is configured for transmitting a negative acknowledgment from said receiving node to said sending node to request retransmission of an entire network packet frame, in response to determining that said number of corrupt data blocks in said plurality of data blocks exceeds a threshold and said retransmitted data blocks are corrupt.

21. A method as recited in claim 19, wherein said sending of said partial acknowledgment comprises piggybacking the unrecoverable or the corrupt data blocks in a subsequent network packet frame transmission from said sending node to said receiving node.

22. A method as recited in claim 21, wherein upon said sending node receiving a partial acknowledgment from said receiving nodes, said sending node piggybacks unreceived data blocks on the data frames which will be transmitted next.

23. A method as recited in claim 22, wherein the space for said piggyback comprises space in the network data frame which is approximately 800 bytes in length.

24. A method as recited in claim 23, wherein said sending node retransmits the entire data frame if the maximum retransmission time is not

exceeded when said sending node receives a negative frame transmission acknowledgment.

25. A method as recited in claim 16, wherein said acknowledgment suppression system is configured to periodically check the network queue and to delete packet acknowledgments in the network queue.

26. A method as recited in claim 25, wherein said packet acknowledgments comprise transport control protocol (TCP) acknowledgments.

27. A method as recited in claim 26, wherein said acknowledgment suppression system is configured for reducing the number of acknowledgments transmitted in bursts, thereby mitigating self-contention within the transport control protocol (TCP) communication.

28. A method as recited in claim 27, wherein said acknowledgment suppression system is configured to determine whether an acknowledgment is unnecessary in the network packet queue so that these unnecessary packets can be deleted from the transport control protocol (TCP) packet queue.

29. A method as recited in claim 28, wherein said acknowledgment suppression system is configured to not delete the acknowledgment packet from the transport control protocol (TCP) packet queue when it is determined that said acknowledgement sequence number in the transport control protocol (TCP) packet queue is equal to the sequence number in the most recent TCP acknowledgment.

30. A network data transfer optimization system for optimizing network packet communications between two non-identical networks, the system comprising:

a network packet data formatting unit configured for formatting network packets into frames for transmission from a first network to a second network;

a network packet retransmission unit configured for partially retransmitting unreceived data blocks in the network packets between said first network and said

second network; and

a network packet suppression unit configured for deleting a number of unnecessary network acknowledgment packets corresponding to network packets transmitted between said first network and said second network to enable a network connection to said first network.

31. A system as recited in claim 30, wherein said first network comprises a network based on the transport control protocol (TCP).

32. A system as recited in claim 30, wherein said second network comprises a network based on an IEEE 802 wireless standard.

33. A system as recited in claim 30, wherein said network packet data formatting unit is configured for formatting a data packet of said first network into a plurality of data blocks for transmission to said second network.

34. A system as recited in claim 33, wherein said plurality of data blocks includes checksum data for determining whether a particular data block is corrupted or uncorrupted.

35. A system as recited in claim 34, wherein said plurality of data blocks further includes forward error correction (FEC) data configured for recovering data from error bits in the plurality of data blocks.

36. A wireless network, comprising:

a first network having a first network transport protocol;

a second network having a second network transport protocol which differs from said first network transport protocol; and

a network data transfer optimization system coupled to a media access control layer of said second network and configured for optimizing data transfer between network nodes in said first network and said second network.

37. A wireless network as recited in claim 36, wherein said first network protocol comprises transport control protocol (TCP).

38. A wireless network as recited in claim 36, wherein said second network protocol comprises an IEEE 802 standard wireless network transport protocol.

39. A wireless network as recited in claim 36, wherein said first network is an Ethernet network.

40. A wireless network as recited in claim 36, wherein said second network is an IEEE 802 standard wireless network.

41. A wireless network as recited in claim 36, wherein said data transfer optimization system comprises a network data formatting unit configured for formatting network data packet frames transmitted in said second network.

42. A wireless network as recited in claim 41, wherein said data transfer optimization system further comprises a network data packet retransmission unit configured for retransmitting partial data packets corresponding to the network data packet frames transmitted from a sending node to a receiving node when the network data packet frames include corrupt or unrecoverable data blocks.

43. A wireless network as recited in claim 41, wherein said data transfer optimization system further comprises a network data packet transmission acknowledgment suppression system configured for removing duplicate or unnecessary data packets from a network data queue to enable a transport control protocol (TCP) connection.

44. A wireless network as recited in claim 42, where said network data packet retransmission unit is configured for dividing up said network data packet frame into data blocks including a media access control layer header having information to enable the data packet frame to be transmitted between said first

network and said second network.

45. A wireless network as recited in claim 44, wherein said data blocks further comprise checksum information for improving the reliability of data transmission between said first network and said second network.

46. A wireless network as recited in claim 44, wherein said data transfer optimization system is configured for piggybacking corrupted or unrecoverable data blocks from a first data packet transmission into a second data frame transmission to complete the transmission of said first data packet.

47. A wireless network as recited in claim 43, wherein said network data packet transmission acknowledgment suppression system is configured to not delete an acknowledgement from the packet queue if its sequence number being transmitted in a transport control protocol (TCP) acknowledgment is equal to the packet in the most recent TCP acknowledgment.